generated from the probe is suppressed by the large stray capacitance. Further, since the radius of curvature of the tip portion of the probe is large, the spatial resolution cannot be increased, In order to increase the spatial resolution, the coated metal has to be made thinner to decrease the radius of curvature of the tip portion thereof; however, this further increases the impedance of the coated metal. In addition, the coated metal is easily peeled off by the friction between the coated metal and the sample. Further, Joule heat generated stays at the tip portion of the probe to dissolve the coated metal at the tip portion of the probe. Thus, the conductivity of the coated metal is decreased.--

A2 cncl

Page 2, replace the paragraph, beginning on line 9, as follows:

--Another object is to provide a scanning probe microscope capable of simply obtaining a concentration of majority carriers in equilibrium or a concentration of dopants in a semiconductor device.--

A3

Page 4, replace the paragraph, beginning on line 26, bridging pages 4 and 5, as follows:

--In the scanning probe microscope of Figs. 1, 2A and 2B, the detector 107 detects the displacement of the conductive probe unit 103, i.e., the displacement of the cantilever 1031 by detecting light beams reflected from the cantilever 1031, so that a contact pressure of the probe 1031a to the sample 101 is

A4

detected. On the other hand, the distance in the Z-direction between the sample 101 and the probe 1031a is controlled by the piezoelectric element 102, so that the contact pressure of the probe 1031a to the sample 101 is brought close to a definite value. Additionally, information regarding a capacitance between the sample 101 and the probe 1031a is detected by the capacitance sensor 105. As a result, two-dimensional surface information of the sample 101 as well as two-dimensional capacitance information of the sample 101 can be obtained.--

A4 end

Page 6, replace the paragraph, beginning on line 28, bridging pages 6 and 7, as follows:

--Also, a detector 6 is provided to detect the vibration state of the conductive probe 3, to generate a detection signal in response to the amplitude of the vibration of the conductive probe 3 or the difference in phase between the vibration frequency of the conductive probe 3 and the frequency f_0 of the oscillator 5. The detector 6 is preferably in proximity to the piezoelectric element 4 or within the piezoelectric element 4. In order to effectively induce a resonant state on the conductive probe 3, the mass of the conductive probe 3 is preferably equivalent to that of the piezoelectric element 4. Also, if the piezoelectric element 4 has a natural resonant frequency as in a crystal oscillator, the conductive probe 3 is vibrated at this natural resonant frequency. In this case, in order not to deteriorate the resonance characteristics of the

A5

piezoelectric element 4, the mass of the conductive probe 3 is preferably as small as possible. A feedback control unit 9 is provided to receive the detection signal of the detector 6 and control the location Z of the sample 1 in accordance with the output signal of the detector 6, so that the amplitude of the vibration of the conductive probe 3 or the difference in phase between the vibration frequency of the conductive probe 3 and the frequency f_0 of the oscillator 5 is brought close to a predetermined definite value. Thus, a feedback control using the detector 6 and the feedback control unit 9 is performed upon the distance between the sample 1 and the conductive probe 3.--

A5 cnd

Page 7, replace the paragraph, beginning on line 35, bridging pages 7 and 8, as follows:

A6

--In addition, since the conductive probe 3 associated with the sharp edge 3a is made of a single material such as W, Pt/Ir Ni, Au or Ag, the sharp edge 3a is hardly peeled off from the conductive probe 3 by the friction between the sharp edge 3a and the sample 1.--

Page 10, replace the paragraph, beginning on line 2, as follows:

A7

--A lock-in amplifier 14 detects a dC/dV signal from the capacitance signal C of the capacitance sensor 8A using the frequency f_1 of the AC voltage of the voltage modulation circuit 7 as a reference, while a 4μm x 4μm predetermined area of the sample 1 is scanned by the conductive probe 3 using the scan

A7 cont

circuit 11. Thus, the dC/dV signal is stored in the memory of the computer 10 in relation to the relative location of the conductive probe 3 in the X- and Y-directions. As a result, a dC/dV image of the sample 1 is obtained by the computer 10 on a dC/dV display unit 15 as shown in Fig. 6B. In this case, if the sample 1 is a semiconductor device, the sign of the dC/dV signal indicates a polarity of dopants in a depletion region immediately below the conductive probe 3, and the absolute value of the dC/dV signal indicates the concentration of stationary charges in the above-mentioned depletion region.--

Page 11, replace the paragraph, beginning on line 6, as follows:

A8

--In Fig. 4, if the sample 1 is made of semiconductor, metal, insulator and the like, a C image displayed on the "C" display unit 13 shows the distribution of each of the semiconductor, metal, insulator and the like. Also, as stated above, a dC/dV image displayed on the dC/dV display unit 15 shows the polarity and concentration of dopants in the sample 1 which is made of monocrystalline silicon, for example. Further, a dC/dV image displayed on the dC/dX display unit 17 shows a distribution of an insulator or the like in the sample 1 which distribution is not dependent upon the dC/dV component of the capacitance between the conductive probe 3 and the sample 1. Note that, since a dC/dX image can be obtained without applying a voltage to the sample 1, a pn junction of a semiconductor substrate which is subject to a

A8 end

voltage applied thereto can be easily observed by the dC/dX image. Further, a $d^2C/dVdX$ image shows a spatial slope of a concentration of dopants in the sample 1.--

Page 12, replace the paragraph, beginning on line 2, as follows:

A9

--Also, in Fig. 4, the output voltage Δ of the servo circuit 9 is applied to the piezoelectric element 2 to move the sample 1 in the Z-direction, so that the vibration amplitude of the conductive probe 3 or the difference in phase between the vibration frequency of the conductive probe 3 and the frequency f_0 of the oscillator 5 is brought close to the definite value V_{REF}. However, this feedback control operation can be carried out so that other electrical characteristic signal such as the "C" signal, the dC/dV signal, the dC/dX signal or the $d^2C/dVdX$ signal can be brought close to the definite value V_{REF}. In this case, the capacitance sensor 8A, the lock-in amplifier 14, the lock-in amplifier 16 or the lock-in amplifier 18 is connected to the servo circuit 9.--

Page 13, replace the paragraph, beginning on line 11, as follows:

A10

--V_o is a voltage applied to the silicon oxide layer 702.--

Page 15, replace the paragraph, beginning on line 7, as follows:

A11

-- $=-V_s d(\ln N_A(X))/dX$ (15)--

Page 16, replace the paragraph, beginning on line 27, as follows:

A12

--The current sensor 8B generates a current signal I relating to a current flowing through between the conductive probe 3 and the sample 1. Thus, the current signal I is stored in the memory of the computer 10 in relation to the relative location of the conductive probe 3 in the X- and Y- directions. As a result, the current flowing through the sample 1 using the current signal I is obtained by the computer 10 on the "I" display unit 13.--

Page 17, replace the paragraph, beginning on line 32, bridging pages 17 and 18, as follows:

A13

--In Fig. 4, if the sample 1 is made of semiconductor, metal, insulator and the like, an I image displayed on the "I" display unit 13' shows the distribution of each of the semiconductor, metal, insulator and the like. Also, a dI/dV image displayed on the dI/dV display unit 15' shows the distribution of in the sample 1. Further, a dI/dX image displayed on the dI/dX display unit 17' shows boundaries of different electrical characteristics in the sample 1. Further, a $d^2I/dVdX$ image shows a spatial slope of conductivity in the sample 1.--

<u>IN THE CLAIMS</u>:

Please cancel claims 1-4, 8, 12, 36-42, and 52-54.